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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/555,041

10/27/2005

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2271/75406

2755

23432 7590 01/26/2009
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EXAMINER

AL HASHIMI, SARAH

ART UNIT

PAPER NUMBER

2853

MAIL DATE

DELIVERY MODE

01/26/2009

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/555,041	Applicant(s) YAMAGUCHI ET AL.	
	Examiner Sarah Al-Hashimi	Art Unit 2853	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 October 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 11, 12 and 14-24 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 11, 12 and 14-24 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

1. Claim 1,11,12,15,17,19,21,23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi (US 2003/0067513) in view of Takahashi (US 2001/0052627).

Eguchi teaches:

Claim 1: a nozzle configured to discharge a liquid drop by using a piezoelectric element (fig 1 #3); wherein the piezoelectric element is a stacked layer type piezoelectric element wherein a plurality of piezoelectric layers and a plurality of electrode layers are reciprocally stacked (para 129 “a stacked type piezoelectric element in which a plurality of layers of piezoelectric material and electrode material are stacked reciprocally”).

Claim 11: a liquid drop discharge head configured to discharge a liquid drop (fig 1); wherein the liquid drop discharge head includes a nozzle configured to discharge the liquid drop by using a piezoelectric element (fig 1 #3), the piezoelectric element is a stacked layer type piezoelectric element wherein a plurality of piezoelectric layers and a plurality of electrode layers are reciprocally stacked (para 129 “a stacked type piezoelectric element in which a plurality of layers of piezoelectric material and electrode material are stacked reciprocally”).

Claim 12: a liquid drop discharge head configured to discharge the liquid drop (fig 1);

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wherein the liquid drop discharge head includes a nozzle configured to discharge the liquid drop by using a piezoelectric element (fig 1 #3), and the piezoelectric element is a stacked layer type piezoelectric element wherein a plurality of piezoelectric layers and a plurality of electrode layers are reciprocally stacked (para 129 “a stacked type piezoelectric element in which a plurality of layers of piezoelectric material and electrode material are stacked reciprocally”).

Claims 15,17,19: said inside electrode layers are reciprocally pulled out to one end of said piezoelectric element and another end of said piezoelectric element (fig 20 #33,34), and wherein said liquid drop discharge head further comprises a driving signal supplying part configured to supply a driving signal and connected to said inside electrode layers at said one end of said piezoelectric element and also to said inside electrode layers at said another end of said piezoelectric element (fig 20 #35).

Claim 21: a plurality of liquid drop discharge heads, each configured in the same manner as said liquid drop discharge head (para 2 line1), wherein said inside electrode layers are reciprocally pulled out to one end of said piezoelectric element and another end of said piezoelectric element (fig 20 #33,34); and further comprising a driving signal supplying part configured to supply a driving signal and connected to said inside electrode layers at said one end of said piezoelectric element and also to said inside electrode layers at said other end of said piezoelectric element (fig 20 #35), wherein said driving signal supplying part is connected to said inside electrode layers at said one end of said piezoelectric element of each liquid drop discharge head individually and is connected to said inside electrode layers at said another end of said

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piezoelectric element of a plurality of liquid drop discharge heads (fig 20 #35-applicable to plural heads).

Claim 23: an image forming apparatus (abs-line 1).

Eguchi does not teach but Takahashi teaches:

Claim 1: the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate, as main ingredients, the piezoelectric material having a sintering temperature less than 1200°C (para 20 “piezoelectric/electrostrictive film 5 is mainly made of (Bi.sub.0.5Na.sub.0.5)TiO.sub.3 ..., it is heated up to a temperature ranging from 900.degree. C. to 1400.degree. C. or preferably from 1000.degree. C. to 1300.degree.”).

Claim 11: the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate, as main ingredients, the piezoelectric material having a sintering temperature less than 1200°C (para 20 “piezoelectric/electrostrictive film 5 is mainly made of (Bi.sub.0.5Na.sub.0.5)TiO.sub.3 ..., it is heated up to a temperature ranging from 900.degree. C. to 1400.degree. C. or preferably from 1000.degree. C. to 1300.degree.”).

Claim 12: the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate as main ingredients, the piezoelectric material having a sintering temperature less than 1200 °C (para 20 “piezoelectric/electrostrictive film 5 is mainly made of (Bi.sub.0.5Na.sub.0.5)TiO.sub.3 ..., it is heated up to a temperature ranging from 900.degree. C. to 1400.degree. C. or preferably from 1000.degree. C. to 1300.degree.”).

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Therefore it would have been obvious to a person having ordinary skill in the art at the time the invention was made to modify Eguchi to incorporate the piezoelectric layer is formed by a piezoelectric material not including lead but having bismuth sodium titanate, as main ingredients, the piezoelectric material having a sintering temperature less than 1200°C as taught by Takahashi for improving the strength of bonding the piezoelectric material and electrodes.

2. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eguchi (US 2003/0067513) in view of Takahashi (US 2001/0052627) as applied to claim 1 above, and further in view of Isshiki (US 2001/0033312).

Eguchi in view of Takahashi does not teach but Isshiki teaches:

Claim 14: a frame member including an opening part formed therein and configured for supply of recording liquid to said nozzle from and external source (para 61 “the frame member 25 has an ink supply opening 26 for supplying ink from the outside into the common liquid chamber 8 of the ink jet head”).

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Eguchi in view of Takahashi to further incorporate a frame member including an opening part formed therein and configured for supply of recording liquid to said nozzle from and external source as taught by Isshiki to make it possible to use an external supply source rather than mandating an integrated one.

3. Claims 16,18,20,22,24 are rejected under 35 U.S.C. 103(a) as being unpatentable over over Eguchi (US 2003/0067513) in view of Takahashi (US

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2001/0052627) as applied to claims 15,17,19,21,23 above, and further in view of Mori (US 2002/0003556).

Eguchi in view of Takahashi does not teach but Mori teaches:

Claims 16,18,20,22,24: said driving signal supplying part is connected to said individual electrode layers via an anisotropic conductive film (para 64 "connecting pairs of corresponding electrodes by wires, and a known ACF (anisotropic conductive film) connecting method, are also usable").

Therefore it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify Eguchi in view of Takahashi to further incorporate said driving signal supplying part is connected to said individual electrode layers via an anisotropic conductive film as taught by Mori in order to improve connectivity of the drive signal with the electrode.

Response to Arguments

4. Applicant's arguments filed 10/20/2008 have been fully considered but they are not persuasive.

Applicant is arguing the validity of the obviousness statement based on the following points:

a) "Takahashi does NOT disclose or suggest, however, that bismuth sodium titanate can be used to enable the use of low cost metals for the electrodes in between layers of piezoelectric material in a stacked type piezoelectric element".

Response: the claims do not specify that bismuth sodium titanate can be used to enable the use of low cost metals for the electrodes.

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b) "One of ordinary skill in the art would NOT be motivated to look to such subject matter (that is, a piezoelectric film type vibrator sensor as proposed in Takahashi for use in devices such as microphones, viscosity sensors, load cells, and accelerometers) for suggestions on how to implement low sintering temperature, lead free, piezoelectric materials for use in a liquid drop discharge head. Takahashi does not provide any teaching or suggestion to incorporate into a liquid drop discharge head a ceramic mainly comprised of bismuth sodium titanate that is sintered at a temperature of less than 1200 degrees Celsius".

Response: Piezoelectric films are commonly and widely used in inkjet heads therefore it is reasonable for one of ordinary skill in the art to consider Takahashi's methods in any device involving piezoelectric films especially since Takahashi has suggested an variety of possible uses.

c) "Takahashi does not suggest the desirability of incorporating a ceramic mainly comprised of bismuth sodium titanate that is sintered at a temperature of 1200 degrees Celsius or less into a liquid drop discharge head such as proposed in Eguchi".

Response: Please refer to the rejection above under the Takahashi reference. (para 20 "piezoelectric/electrostrictive film 5 is mainly made of (Bi.sub.0.5Na.sub.0.5)TiO.sub.3 ..., it is heated up to a temperature ranging from 900.degree. C. to 1400.degree. C. or preferably from 1000.degree. C. to 1300.degree. "). Clearly this includes a temperature of 1200 degrees Celsius or less. Applicant's argument regarding the current rejection in this instance is refuted by the prior art.

Conclusion

5. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sarah Al-Hashimi whose telephone number is 571 272 7159. The examiner can normally be reached on M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Meier can be reached on 571 272 2149. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either PAIR or Public PAIR. Status information for unpublished applications is available through PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/SA/

/Stephen D Meier/
Supervisory Patent Examiner, Art Unit 2853